PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

Improvements in and relating to Wrenches.

I, CARL WALTER, of Heckinghauserstrasse 19—23, Wuppertal-Barmen, Germany, a German Citizen, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

With wrench appliances for rotating bodies or for holding bodies against rotation and consisting of a lever with a clamping element in the form of a clamping band or manacle hinged at one side to the lever, there is the difficulty of preventing a relative slipping of the clamping band and the body which is to be rotated. This is an absolute necessity for the appropriate operation of the appliance because it is found that adequate transmission of force between the two elements cannot be attained at all if the clamping band begins to slip even only a little on applying the lever in the direction of rotation. For avoiding this and according to the invention a suitable shaping of the clamping band is necessary in order to attain as uniform as possible an application of the clamping band to the entire periphery of the body to be rotated in spite of the action of the lever forces which tend to deform the clamping band and accordingly tend to lift it in part from the body to be rotated. Further, for avoiding this slipping a certain preliminary clamping tension of the clamping band is requisite, i.e., its internal aperture under the action of a preliminary tensioning spring such as has already been proposed in wrenches of the kind initially referred to must be somewhat smaller than the cross section of the body to be rotated. On the other hand this requirement is in apparent conflict with the stipulation that in rotating the appliance in the opposite direction the clamping band must lift automatically to such an extent that it is not able to drag the body to be rotated along with it in the opposite direction due to frictional engagement. These conditions which are partially in contradistinction are complied with in accordance with the invention in that the thickness of the clamping band or manacle decreases from the point of engagement of the lever to the section remote from the lever and, under the action of the preliminary tensioning spring, the lever urges the free end of the clamping band inwardly. The diminishing thickness of the clamping band from the point of engagement with the lever to the opposite side has the effect that at the points where the lever forces operate thereon the clamping band is so rigid that the lever forces are not capable of deforming these points but the deformation occurs substantially at the opposite narrowed portion. Consequently in the present case the lever actions operate after the manner of the limbs of tongs on the jaws of the tongs in that here the limbs of the tongs are replaced by the narrowed portion of the clamping band at the ends of which the lever operates to compress the clamping band. Here the spring disposed between the clamping band and the lever has the result that the free end of the clamping band is urged inwardly by the lever so that the free cross section of the clamping band is constricted against the action of the resilient spreading tendency thereof somewhat more than corresponds to the cross section of the body which is to be rotated. If however the lever is rotated in the opposite direction then the action of the preliminary tensioning spring is immediately overcome and as moreover the free end of the clamping band is in its rotation in the opposite direction released by the lever to a corresponding extent, the clamping band in this direction of rotation can lift somewhat under the action of its inherent elasticity; now by this lifting the free cross section of the clamping claw is enlarged to such an extent that the clamping claw is not capable of taking the body to be rotated along with it in this latter direction of rotation so that the body does not participate in the retrograde rotation of the appliance. Also the narrowing of the clamping band increases its resilience so that by this configuration of the clamping band not only is a more appropriate clamping pressure of the band in the one direction of rotation attained

[*Price* 1/-]

but also an automatic lifting thereof in the release of the tension thereon in the opposite direction results.

The hinged association of the lever with the clamping claw necessitates one or more projections on the latter extending towards the lever and provided with an aperture for receiving the pivot pin and further the claw must be provided with a slot permitting of its contraction to a smaller periphery. In order to be able to manufacture the claw without any working such as grinding, boring or the like, in spite of these various apertures, according to a further feature of the invention the claw consists of a plurality of superimposed flat members one or more of which is provided with a projection serving for its hinged connection with the lever. These flat members together with all the apertures which are necessary therein can be stamped from sheet metal and can be joined together by one or more rivets so that when superimposed they constitute the claw in the finished form. The subdivision of the claw into a plurality of layers also affords the possibility of enabling the slots provided at the ends of the claws in the individual layers to be relatively offset so that the slotted portions of any individual layer is guided by the solid portion of an adjacent layer and the claw is correspondingly more resistant to distorting forces tending to bend it out of its plane. The subdivision of the claw into various layers also affords the further advantage that the elasticity of the claw is correspondingly greater than in the case of a claw consisting of a single thick cast member.

In order to be able to use the claw with different apertures, insertions which are stepped relatively to each other and which can be inserted within the jaw, are provided; according to one feature of the invention these insertions are transversely slotted so that they can be compressed by the clamping jaw to an extent depending on the width of the slot. This affords the advantage on the one hand that the insertions can be resilient and abut with a certain resilient pressure against the clamping jaw whereby a slipping of the two parts relatively to each other is very effectively prevented at the beginning of the rotation; this construction of the insertions also affords the further advantage that under the action of the clamping claw, the free aperture of the insertions is correspondingly reduced, so that the insertions also fit with a corresponding clamping pressure about the bodies which they embrace so as to prevent a sliding of the body relatively to the insertion even if originally there is a certain play between them.

Certain embodiments of the invention are shown by way of example in the accompanying drawing in which

Figs. 1 and 2 show a longitudinal section and a cross section through one embodiment of a nut wrench construction in accordance with the invention.

Fig. 3 shows a second embodiment of the clamping claw in the half finished state.

The tool consists of a lever *a* and a manacle-like clamping jaw *c* hinged to the end of the lever at *b*. The clamping claw is thickened at its two ends c^1 and c^2 and tapers towards the point c^3 remote from the lever, so that at the side opposite to the lever it is of least thickness. A lug *d* on the lever abuts against the free end c^2 of the clamping claw which terminates in a wedge shaped point and the contacting surfaces of the end of the claw c^2 and the lug *d* on the lever are so formed that on rocking the lever *a* relatively to the claw *c* in the direction of the arrow in Fig. 1, the lug *d* is adapted to compress the clamping claw without the surfaces of contact between the lug *d* and the end c^2 of the claw becoming wedged; this is attained in that the two co-operating surfaces of the end c^2 of the claw and the lug *d* on the lever are directed obliquely relatively to each other. Between the ends c^1 and c^2 of the clamping claw is a gap *e* of suitable width which when the clamping claw is compressed by the lever *a* is correspondingly narrowed but is initially so wide that in the narrowest position which the clamping claw can assume during use there is still a certain play between the two ends of the claw. Between the end c^1 of the claw and the lever *a* is a spring *f* which urges the lug *d* on the lever against the end c^2 of the claw and consequently causes the clamping claw to be depressed to a certain extent against its natural elasticity.

If the body to be rotated is of cylindrical form then the claw can be applied directly thereto; the dimensions of the claw and of the spring *f* must in this case be such that the free aperture of the claw is somewhat smaller than the diameter of the body to be rotated. If the body which is to be rotated has an angular section then an insertion *k* having an aperture corresponding to the outline of the body to be rotated, is provided within the claw *c*. This insertion has, for example, an aperture corresponding to the outline of an hexagonal nut, a hexagonal bolt or a rectangular bolt or the like. This insertion *k* which is cylindrical on its outer surface is gripped by the claw *c* under the action of the spring *f* with a

certain preliminary pressure which from the commencement affords a frictional connection between the claw c and the insertion k corresponding to the magnitude of the turning force which is to be exerted.

If necessary and as shown in Figs. 1 and 2, a plurality of stepped insertions k^1, k^2 fitting one within the other may be provided so that in this way the width of the jaw of the claw may be adapted to bodies of various dimensions. Also, as shown in Fig. 1, the insertions may have a transverse slot g so that on rocking the lever in the direction of the arrow they are caused to contract under the action of the contracting claw and thus abut firmly against the body which is to be rotated.

If the lever a is moved in the opposite direction to the arrow then the lug d on the lever releases the end c^3 of the claw to a corresponding extent, so that in view of its natural resilience the claw expands somewhat and becomes spaced from the body it embraces, so that the latter does not participate in a rotation of the lever in a direction opposite to that indicated by the arrow.

The clamping claw may be unitary or as shown in Fig. 2 it may be built up from a plurality of superimposed flat members c^4. The lever may embrace the clamping claw and in this case all the flat members c^4 can have the same shape. If, on the other hand, as indicated in Fig. 2, for example, the lever a is introduced within the clamping claw then the two outer flat members each have a projection c^5 with a corresponding aperture serving to receive the pivot pin b. On the other hand, however, the inner flat member or members c^4 may be provided with the projections c^5 having the aperture for the pivot pin and the lever a can embrace this portion of the claw. The flat members c^4 are held together by one or more rivets j as well as by a sleeve or alternatively as shown in Fig. 2 by the insertion k^1 which in this case is provided at one end with a flange h and, as also shown in Fig. 2, they are held in position on this sleeve or insertion by means of an annular spring i. As shown in Fig. 1 the slots e in adjacent flat members may be located so as to be in relatively off-set positions so that the slots e do not coincide and in this way the slotted portion of one of the flat members is guided by an unslotted portion of the adjacent member or members.

The embodiment of the clamping claw shown in Fig. 3 consists of two flat members c^6 connected by a bridge member m. The members c^6 in the construction of Fig. 3 may either be bent to lie directly one against the other or may be bent up to receive between them further insertions or flat members c^4.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A wrench consisting of a manacle-like clamping claw and a lever hinged at one side of the clamping claw and acting on its other end, wherein the thickness of the clamping claw decreases from the points of engagement with the lever to the point opposite the lever and a preliminary tensioning spring is arranged between the lever and the clamping claw whereby the lever operates on the clamping claw under the action of the spring to contract the claw.

2. A wrench as claimed in claim 1, in which the co-operating surfaces on the projection on the lever and the free end of the clamping claw are directed obliquely with respect to each other in the position they assume under the action of the spring.

3. A wrench as claimed in claim 1 or 2, wherein the clamping claw consists of a plurality of flat members disposed one on top of the other in their axial direction.

4. A wrench as claimed in claim 3, in which the flat members, preferably sheet metal sections, are of different shape and at least one of them has a projection serving for the hinged connection of the claw to the lever.

5. A wrench as claimed in claim 3 or 4, in which the gaps are formed between the ends of the flat sections or members of the claw are off-set relatively to each other.

6. A wrench as claimed in in claim 3, 4 or 5, in which the flat members are arranged in a row on a sleeve on which they are retained by means of an annular spring.

7. A wrench as claimed in claim 6, wherein the sleeve also constitutes an insertion in the claw of aperture corresponding to the outline of the body which it is desired to rotate.

8. A wrench as claimed in any of the preceding claims, and provided with one or more interchangeable insertions which are slotted transversely to enable them to expand and contract elastically.

9. Wrenches constructed, arranged and adapted to operate substantially as described with reference to the accompanying drawing.

Dated this 7th day of July, 1932.
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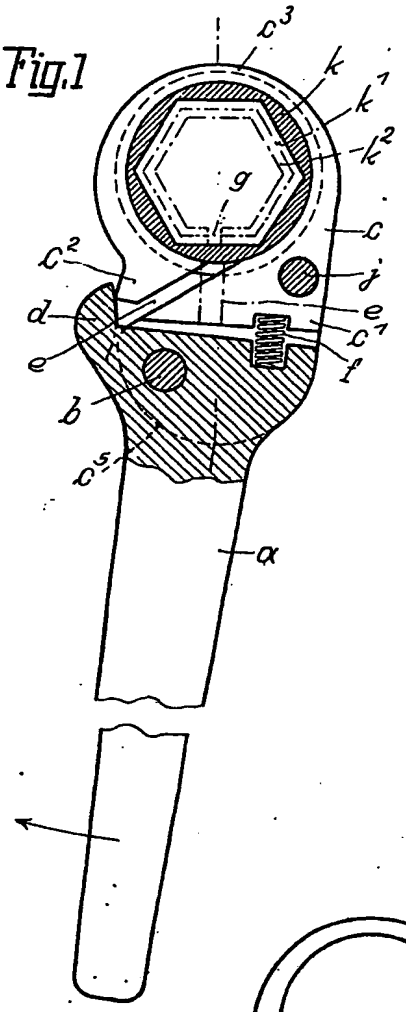
Fig. 1



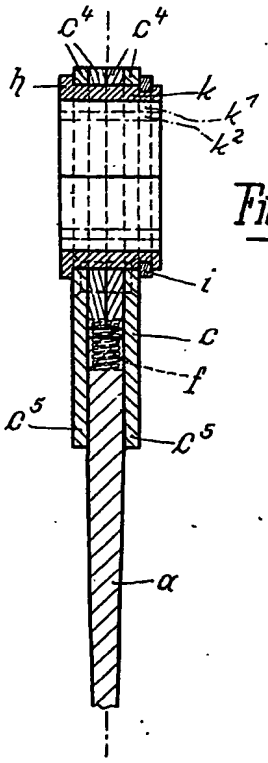


Fig. 2

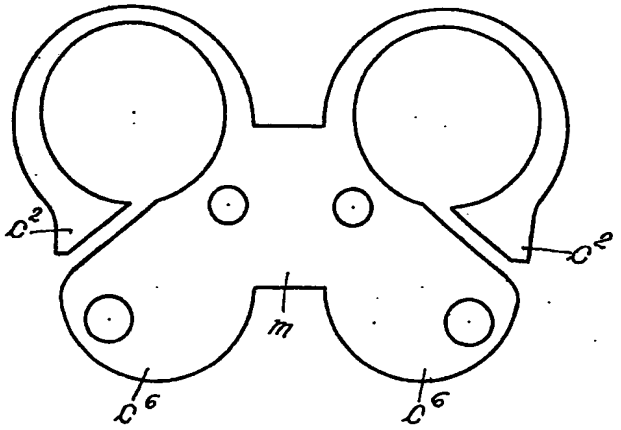


Fig. 3

Malby & Sons, Photo-Litho.